indicated a preferential affinity of native calvasculin for 36 kDa-MAP among the extracellular matrix proteins, such as collagens I-V and fibronectin, in a Ca^{2+}-dependent manner. Partial amino acid sequence of 36 kDa-MAP (total 151 residues) was determined. A search of the NBRF data base revealed that 36 kDa-MAP had no significant level of homology with other proteins. Our results suggest the presence of a novel Ca^{2+} messenger system in vascular smooth muscle cells. Further characterization of 36 kDa-MAP, particularly its biochemical function and cDNA cloning, should lead to understanding of its role in structure and function of blood vessel wall.

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ALL-OR-NONE LIKE CALCIUM RELEASE FROM INTRACELLULAR STORES BY AGONISTS IN SMOOTH MUSCLE CELLS

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Calcium release from the intracellular stores is essential in the initial phase of agonist-induced smooth muscle contraction. We have found that in smooth muscle cells, agonist-induced calcium release occurs in an all-or-none like manner. Single cells isolated from guinea-pig taenia caeci mostly gave no response to 1,000 nM carbachol but full response to 2,000 nM. About a half of cells gave full response to 1,500 nM carbachol, while the remainder did not respond at all. Confocal microscopic study revealed that under agonistic action calcium wave(s) starts at the most sensitive spot(s) in a cell and propagate throughout the cell, thus forming the basis of the all-or-none behaviour. Calcium-induced calcium release (CICR) in the narrow sense does not contribute to this propagation, because ryanodine, which affects only open CICR channels to fix the channels in the open state, exerted no effects during agonist-induced calcium release. Calcium-activated inositol-triphosphate (IP3) formation is not the basis of the wave either, because the same amount of IP3 was formed by agonist even when calcium release response was negligible. The accelerating effect of calcium on IP3-sensitive channel is exerted quickly enough to constitute a positive feedback loop during a single agonistic action, and this satisfactorily explains the all-or-none type behaviour.

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THE PHYSIOLOGICAL AND PHARMACOLOGICAL FEATURES OF NEUROTRANSMITTER-ACTIVATED NONSELECTIVE CATION CHANNELS (NSCC) IN SMOOTH MUSCLE

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In various types of smooth muscles, openings of Ca-permeable NSCC have been identified in response to neurotransmitters and autocoids. Here we describe the NSCCs of guinea-pig ileum and rabbit portal vein. Stimulation of the muscarinic receptor in guinea-pig ileum activates single cationic channels of 20~30pS (mNSCC). mNSCC are permeable to cations, with the sequence of Ba>=Ca>Na=-Li>=Cs>=K>>Mg. Quinine and diphenylamine-2-carboxylates potently block mNSCC. Besides these consensus properties of NSCC, mNSCC seem to possess several unique properties. Voltage-dependence: depolarizations increase the open probability of mNSCC. Ca-dependence: the activity of mNSCC is potentiated by the intracellular Ca^{2+} ions. pH-dependence: the activity of mNSCC is incrementally regulated by both the intracellular and extracellular proton concentrations. External divalent cations such as Zn^{2+}, Cd^{2+} and Ni^{2+} block mNSCC. The involvement of a pertussis toxin-sensitive G-protein has been suggested in activation of mNSCC. Similar properties have been obtained for the $alpha_1$-adrenergic receptor-activated NSCC in the portal vein. They have a single channel conductance of 25 pS, and are voltage-dependent and sensitive to the blockade by divalent cations.

These results suggest that NSCC in smooth muscle are subject to the regulations of various factors changing dynamically in the physiological environments and may participate in the fine control of Ca^{2+} homeostasis of smooth muscle.

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10

ENDOTHELIUM DEPENDENT RELAXING INFLUENCE ON VASCULAR SMOOTH MUSCLE IS IMPAIRED IN THE AORTA OF THE DIABETIC, OBESE MOUSE

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Diabetic obese mice (Umeå ob/ob) show dyslipidemia and elevated plasma glucose and insulin levels. These metabolic changes resemble those of many obese, hypertensive humans ("the metabolic syndrome"). The aim of our study was to examine whether the endothelial vascular control in the obese mice differs from that of the lean controls (Umeå ob/+ or +/+). Isometric contractions were measured in rings from thoracic aortae of the two strains. The pEC_{50} values for norepinephrine (NE) responses in rings with intact endothelium were similar for lean and obese mice, 7.72±0.16 and 7.80±0.18, respectively (mean±SD,n=10 and 11). However, the maximal contractile response to NE in intact rings from obese mice was 33±10% of that obtained in presence of 0.1 mM Nω-nitro-L-arginine (n=40) whereas this value for rings from lean mice was only 12±5% (n=15), $p<0.01$. Precontracted (10 nM NE) intact rings from lean and obese mice relaxed by 95±4% and 65±20% (n=4), respectively, in response to 10 µM acetylcholine (Ach). The Ach response was abolished by mechanical removal of the endothelium in rings from both strains. The results suggest that endothelial NO